1. Discourse Profile Constructions

- Wittgenstein (1953): for many cases, “the meaning of a word is its use in language.”
- However, the use from which the meanings of morphemes, words, or constructions emerge is a fluid, ill-defined concept.
- Different approaches under the overarching umbrella of Usage-Based linguistics suggest different accounts of this matter.

Dattner (2015) showed that the use from which the meanings of the Hebrew dative emerge can be conceptualized as a Discourse Profile Construction: emergent form-function conventional correlations which are defined by different clusters of formal and functional information.

Discourse Profile Constructions include information from multiple sources, such as event types, participant roles, affectedness, and subjectivity.

The concept is built on a multivariate statistical corpus analysis (Multiple Correspondence Analysis, and Hierarchical Clustering on Principal Components) of 10,000 Hebrew sentences that contain a dative pronoun.

Dattner (2015) concluded that traditional analyses of dative roles are not reflected in usage, to the extent that there are different traditionally-defined roles that show no difference in terms of their usage pattern.

That is, from a usage-based perspective, it is not the fine-grained differences between very similar semantic roles which is important for interpretation, but rather the Discourse Profile Construction the token resembles. For example, the following sentence contains non-lexical datives which, considering a lexical/syntactic approach, should pose a problem for interpretation:

(metiksh ha-metiksh be’itan la-ma) "The research center prepared a position paper."

- The Discourse Profile Constructions approach: what guides the interpretation of the dative in (1) is its Discourse Profile Construction.
- This sentence shares a multifacral usage pattern with other tokens of the language.
- The Discourse Profile Construction this sentence belongs to is the Transitive Discturce Profile Construction, which emerges out of a set of utterances that are characterized as having a transitive predicate that belongs to a specific class of verbs, a reals mode, a three-participant event in which the affected participant is highly affected and the affecting participant has high agenticity and volition.
- That is, it is a non-subjuctive clause with high transitivity, that constrains a relation between a two participant event and a third participant.

- Figure 1 presents the first two dimensions of a Multiple Correspondence Analysis map, and the result of a Hierarchical Clustering on Principal Components process: The 9,694 dative tokens in the map are color-coded according to the clusters they belong to.

- Dattner (2015) shows that each such cluster of tokens sharing a usage pattern can be treated as a Discourse Profile Construction.

2. Naive Discriminative Learning

- Dattner’s (2015) findings are grounded on frequent associations and co-occurrences, and are conceptualized within a framework that seeks abstract organizing principles and roles of association.
- Frequency, however, is not the only power that drives learning (Baayen et al. 2016).
- Baayen et al. (2016) show that it is discrimination, rather than mere frequency, that guides learning.

- The Discourse Profile Constructions presented in Dattner (2015) can thus be seen as the ever-changing result of a process of implicitly learning the weights of different features with respect to the use of the Hebrew dative.
- In such a process speakers learn how different clusters of formal and functional parameters (i.e., Discourse Profile Constructions) discriminate one experience of the world from others.
- While Dattner’s (2015) Discourse Profile Constructions are descriptively adequate, they do not provide a psychological explanation regarding grammatical knowledge and learning.
- Here comes Naive Discriminative Learning.

- Naive Discriminative Learning is a computational modeling framework based on principles of human learning, unique in offering a direct mapping of form onto meaning, that has been shown to perform well in simulations of human processing (Baayen, 2010; 2011; Ramscar and Bayem, 2013).
- The Naive Discriminative Learning model assumes that learning to productively use language is an error-driven associative learning process, which is sensitive to the informativeness of co-occurrences, rather than to their mere occurrence, thus going beyond frequency-based explanations and building on concrete experiences of associations between cues and outcomes.

In order to test the hypothesis that Discourse Profile Constructions can be seen as the result of a discriminative learning process, I used Naive Discriminative Learning to model the form-function links represented as Discourse Profile Constructions.

3. Learning Discourse Profile Constructions

Method:

- Thus I defined the association strengths (weights) from cues to outcomes for the situation in which these strengths no longer change (that is, the adult state).
- The cues of the current model are partially abstract: the four lexical categories that constitute the formal structure of the token (main verbs are represented by their verbal paradigm, the binyan).
- The outcomes of the current model are the five Discourse Profile Constructions defined in Dattner (2015).
- Note that the formal categories used as cues in the present model were not used in the clustering process leading to the definition of Discourse Profile Constructions (except for the verbal paradigm, the binyan).

- Table 1 exemplifies six tokens; their cues and their outcomes.

Results:

- Model accuracy: 0.9497627
- 10-fold cross-validation mean accuracy: 0.9498699
- Table 2 shows a crosstabilization of observed and predicted values:

<table>
<thead>
<tr>
<th>Cues</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
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<tr>
<td>5</td>
<td>4</td>
</tr>
</tbody>
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- Figure 2 shows permutation accuracy importance: the reduction in accuracy for predicting the Discourse Profile Construction when a predictor is randomly permuted.

- The fourth word in the construction is marked as most important by the Naive Discriminative Learning model.

4. Conclusions and implications for a Usage-Based Grammar

- The present research adopts the hypothesis presented above and the discriminative motivated learning model, and further examines the Discourse Profile Constructions presented in Dattner (2015) from a learning approach, to show that the concept of Discourse Profile Constructions may aid in learning the associations between form and meaning.
- I show that by assuming grammatical knowledge to consists of Discourse Profile Constructions, rather than abstract syntactic rules, a psychologically motivated statistical learning algorithms can learn the association between concrete formal parameters and different construals of the world, in terms of event types, participant roles, affectedness, and subjectivity (all included in Dattner’s (2015) Discourse Profile Constructions).
- This implies that a Usage-Based grammar should take into account the concrete, multifacral, multilayered concept of Discourse Profile Construction as its core form-function correlation, rather than concepts that consider abstract levels of the language in isolation.

References